Test Bank

Calculus

TENTH EDITION

Ron Larson

Bruce Edwards

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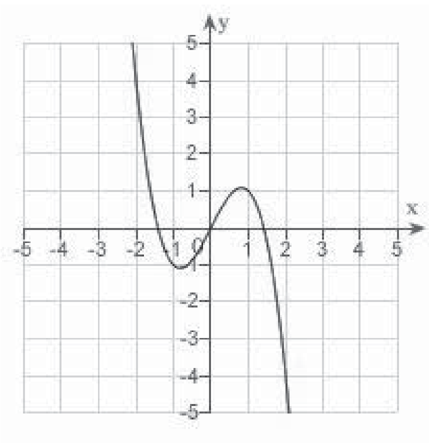
P.1 Graphs and Models

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Which of the following is the correct graph of $y = -\sqrt{2 - x^2}$?

a.



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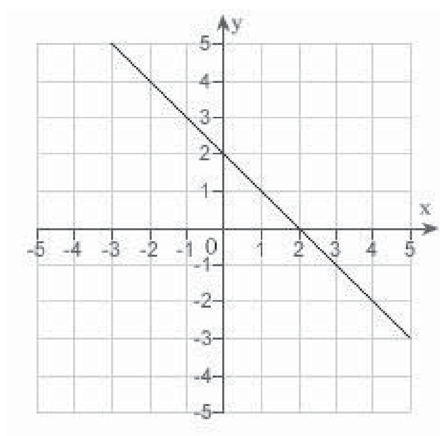

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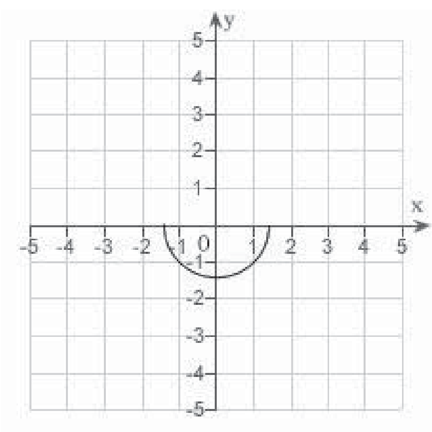

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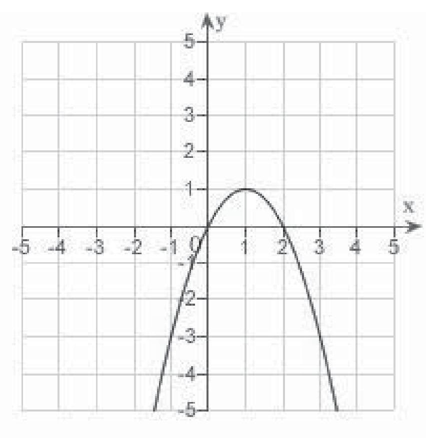

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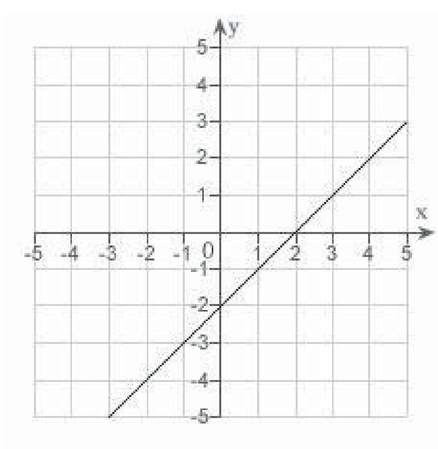
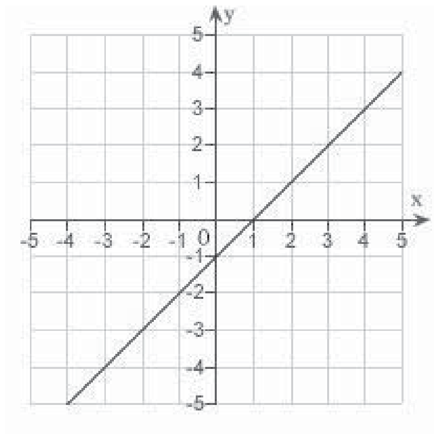


____ 2. Which of the following is the correct graph of $y = x - x^3$?

a.



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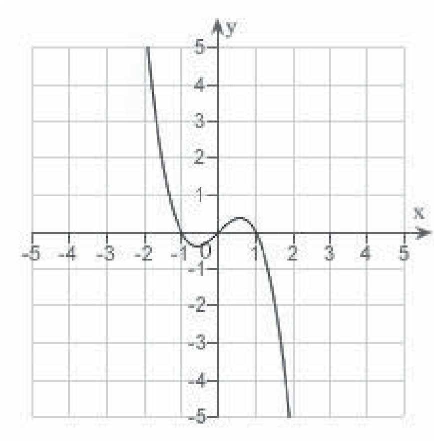

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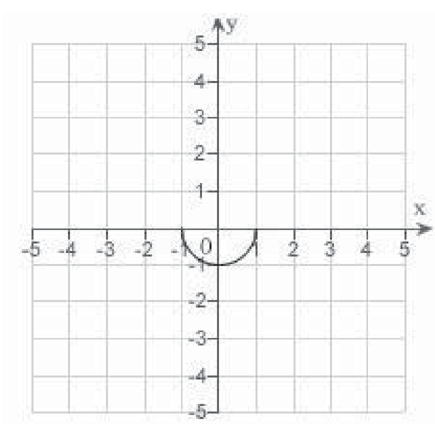

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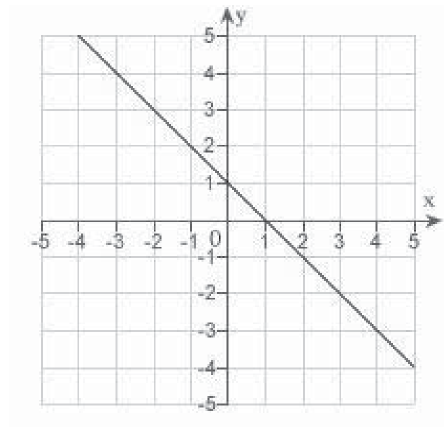
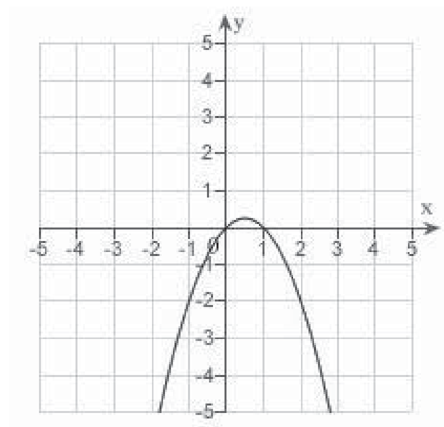


e.



____ 3. Find all intercepts:

$y = x^2 - x - 12$

a. x-intercepts: (4,0), (−3,0); y-intercepts: (0, 4), (0, 3)
b. x-intercept: (12, 0); y-intercepts: (0, 4), (0, 3)
c. x-intercepts: (4, 0), (–3,0); y-intercept: (0, −12)
d. x-intercepts: (4, 0), (−3,0); y-intercepts: (0, –12), (0, 12)
e. x-intercept: (−3, 0); y-intercept: (0, –12)

____ 4. Find all intercepts:

$y = (x+5)\sqrt{4-x^2}$

a. x-intercepts: (–5, 0), (–2, 0), (2, 0); y-intercepts: (0, 0), (0, 10)
b. x-intercepts: (–5, 0), (2, 0); y-intercept: (0, 10)
c. x-intercepts: (–5, 0), (2, 0); y-intercept: (0, –10)
d. x-intercepts: (–5, 0), (–2, 0), (2, 0); y-intercept: (0, 10)
e. x-intercepts: (–5, 0), (–2, 0), (2, 0); y-intercept: (0, –10)

____ 5. Test for symmetry with respect to each axis and to the origin.

$x^2y^2 = 8$

a. symmetric with respect to the origin
b. symmetric with respect to the x-axis
c. symmetric with respect to the y-axis
d. no symmetry
e. A, B, and C

____ 6. Test for symmetry with respect to each axis and to the origin.

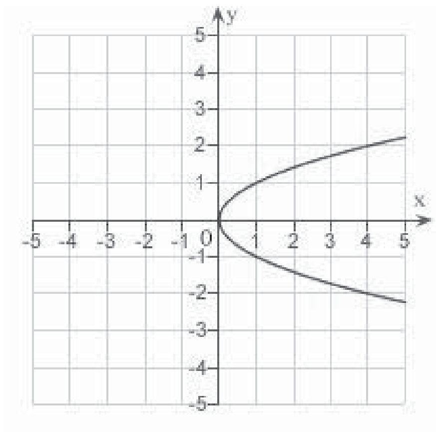
$y = \dfrac{x^2+2}{x}$

a. symmetric with respect to the origin
b. symmetric with respect to the y-axis
c. symmetric with respect to the x-axis
d. both B and C
e. no symmetry

____ 7. Sketch the graph of the equation:

$x = 4 - y^2$

a.



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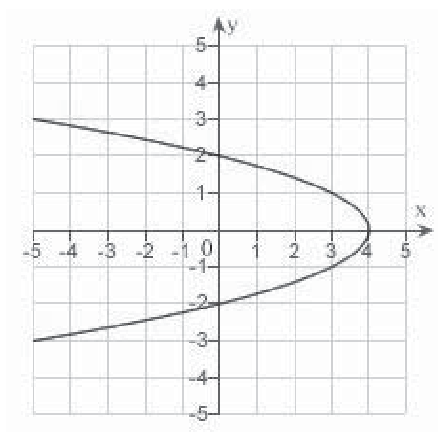

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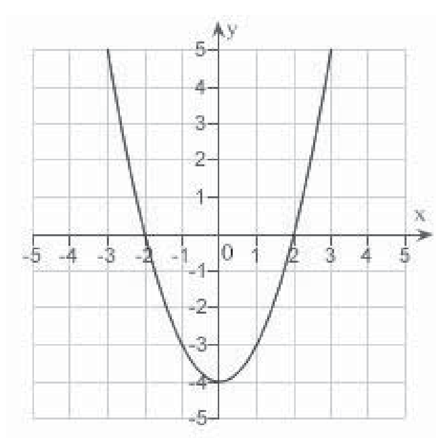

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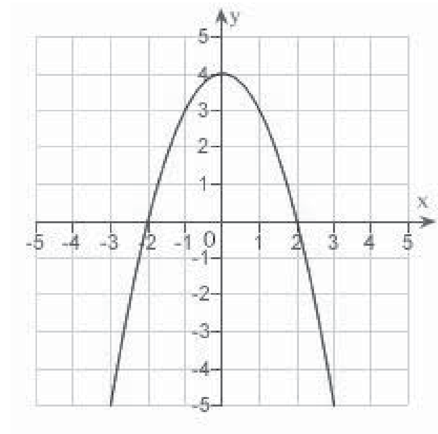
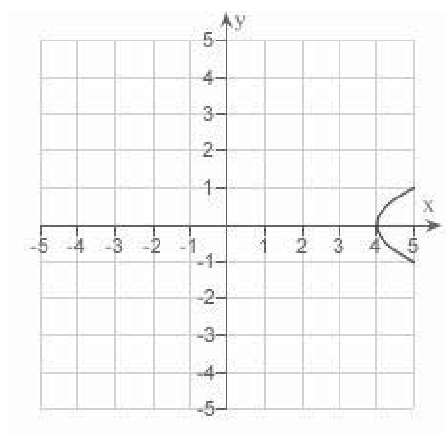


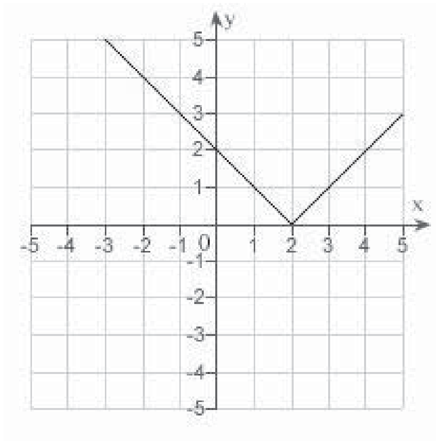
e.



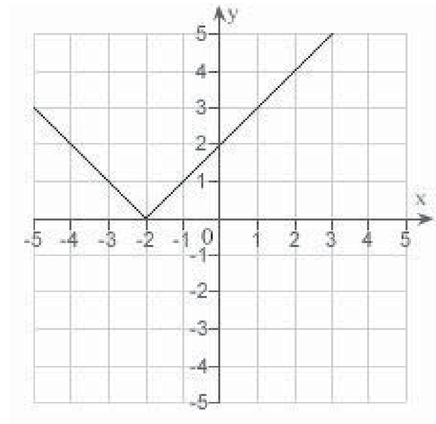
____ 8. Sketch the graph of the equation:

$y = |x + 2|$

a.



d.



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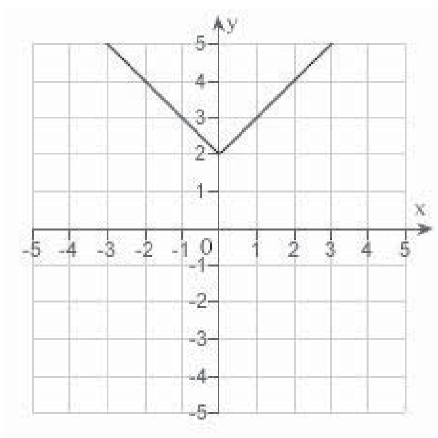
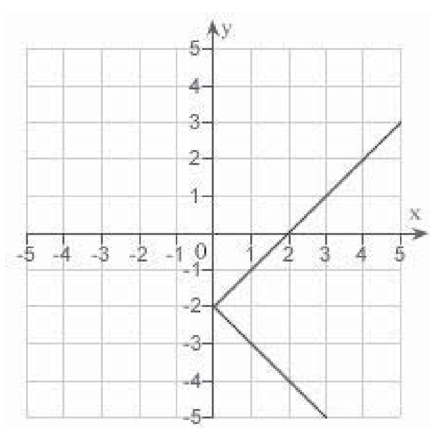


e. none of the above

c.



____ 9. Find the points of intersection of the graphs of the equations:

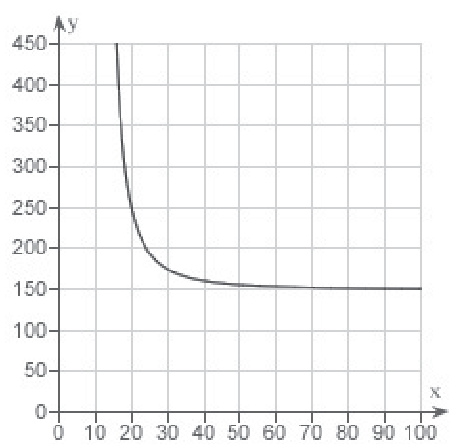
$x = y^2 - 3$

$y = x + 1$

a. $(-2,\ 1), (-1,\ 2)$
b. $(-2,\ 0), (1,\ 2)$
c. $(-2,\ -1), (1,\ 2)$
d. $(2,\ -1), (-1,\ 2)$
e. $(-2,\ -3), (-1,\ 2)$

____ 10. The resistance y in ohms of 1000 feet of solid metal wire at $77°F$ can be approximated by the model $y = \frac{10,000}{x^2} - 0.57,\ 5 \le x \le 100,$ where x is the diameter of the wire in mils (0.001 in). Use a graphing utility to graph the model $y = \frac{10,000}{x^2} - 0.57,\ 5 \le x \le 100.$

a.



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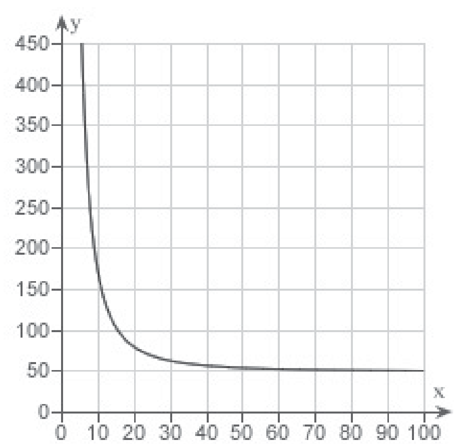
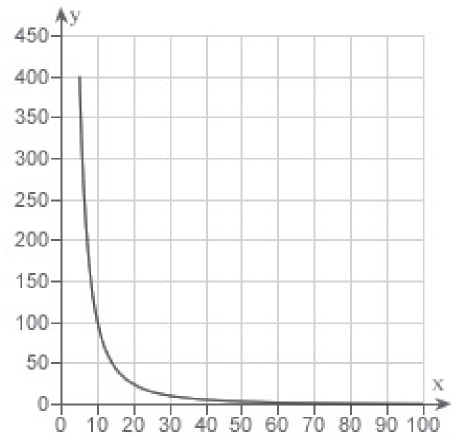
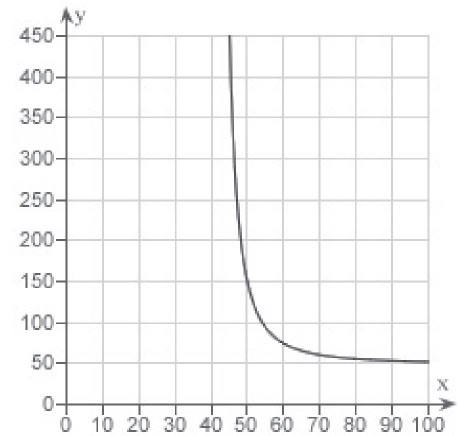


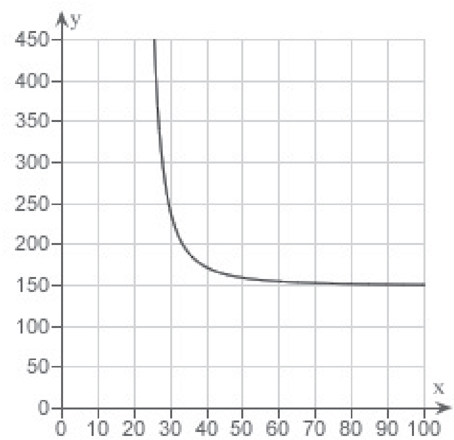
b.



e.



c.



____ 11. The resistance y in ohms of 1000 feet of solid metal wire at $77°F$ can be approximated by the model $y = \dfrac{12,000}{x^2} - 0.46,\ 5 \le x \le 100,$ where x is the diameter of the wire in mils (0.001 in). If the diameter of the wire is doubled, the resistance is changed by approximately what factor? In determining your answer, you can ignore the constant –0.46.

a. $\dfrac{1}{2}$
b. $\dfrac{1}{5}$
c. 4
d. 5
e. $\dfrac{1}{4}$

____ 12. Test for symmetry with respect to each axis and to the origin.

$y = x^2 - 8$

a. symmetric with respect to the origin
b. symmetric with respect to the y-axis
c. symmetric with respect to the x-axis
d. both B and C
e. no symmetry

____ 13. Test for symmetry with respect to each axis and to the origin.

$|y| - x = 6$

a. symmetric with respect to the origin
b. symmetric with respect to the x-axis
c. symmetric with respect to the y-axis
d. no symmetry
e. A, B, and C

____ 14. Find all intercepts:

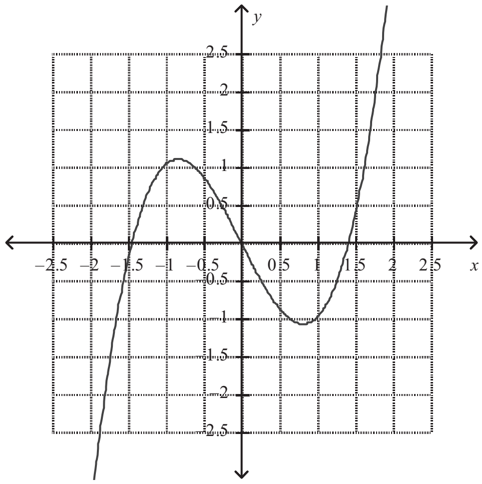
$y^2 = x^3 - 25x$

a. x-intercepts: (0,0), (5,0), (-5,0); y-intercept: (0, -25)
b. x-intercepts: (0,0), (5,0); y-intercept: (0, 0)
c. x-intercepts: (0,0), (5,0), (-5,0); y-intercept: (0, 0)
d. x-intercepts: (0,0), (5,0); y-intercept: (0, 5)
e. x-intercepts: (0,0), (5,0), (25,0); y-intercept: (0, 0)

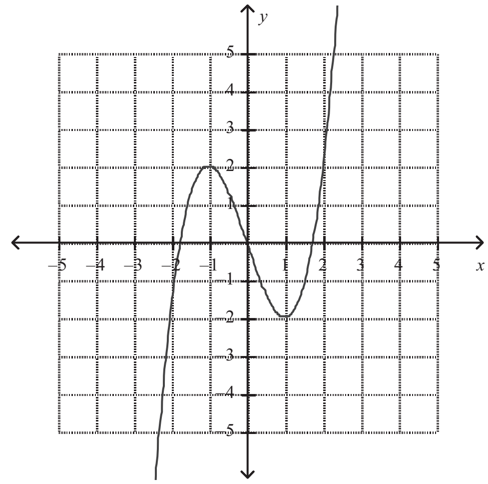
____ 15. Sketch the graph of the equation:

$y = x^3 - 3x$

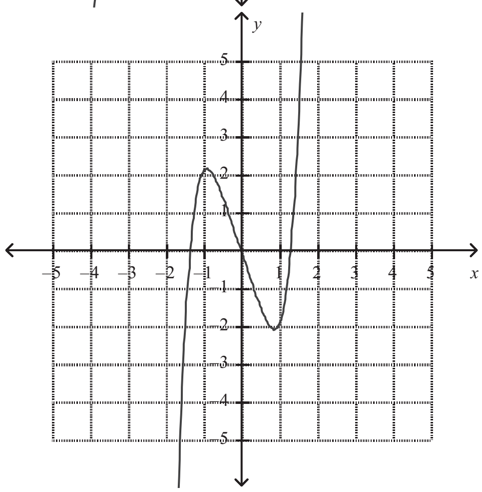
a.



d.

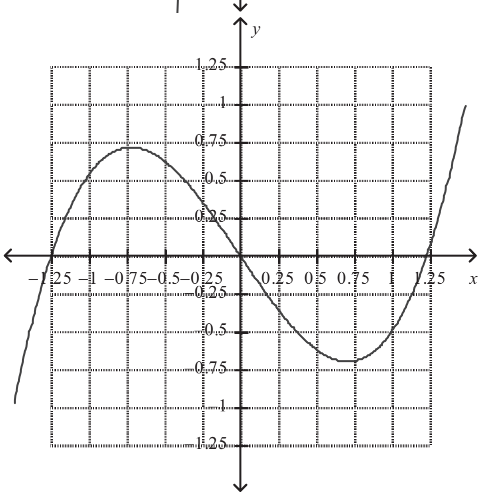


b.



e. none of the above

c.



P.1 Graphs and Models
Answer Section

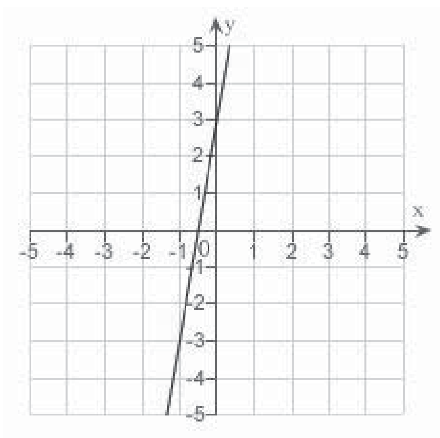
MULTIPLE CHOICE

1.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the graph of a semicircle						MSC:	Skill
2.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the graph of a cubic equation						MSC:	Skill
3.	ANS:	C	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Calculate the intercepts of an equation						MSC:	Skill
4.	ANS:	D	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Calculate the intercepts of an equation						MSC:	Skill
5.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the type of symmetry of the graph of an equation						MSC:	Skill
6.	ANS:	A	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the type of symmetry of the graph of an equation						MSC:	Skill
7.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Graph a quadratic equation in y						MSC:	Skill
8.	ANS:	D	PTS:	1	DIF:	Med	REF:	Section 0.1
OBJ:	Graph an absolute value equation						MSC:	Skill
9.	ANS:	C	PTS:	1	DIF:	Med	REF:	Section 0.1
OBJ:	Calculate the points of intersection of the graphs of equations						MSC:	Skill
10.	ANS:	B	PTS:	1	DIF:	Med	REF:	Section 0.1
OBJ:	Plot a rational model using the capabilities of a graphing utility						MSC:	Application
11.	ANS:	E	PTS:	1	DIF:	Med	REF:	Section 0.1
OBJ:	Interpret a rational model						MSC:	Application
12.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the type of symmetry of the graph of an equation						MSC:	Skill
13.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Identify the type of symmetry of the graph of an equation						MSC:	Skill
14.	ANS:	C	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Calculate the intercepts of an equation						MSC:	Skill
15.	ANS:	D	PTS:	1	DIF:	Easy	REF:	Section 0.1
OBJ:	Graph an equation in y						MSC:	Skill

P.2 Linear Models and Rates of Change

Multiple Choice
Identify the choice that best completes the statement or answers the question.

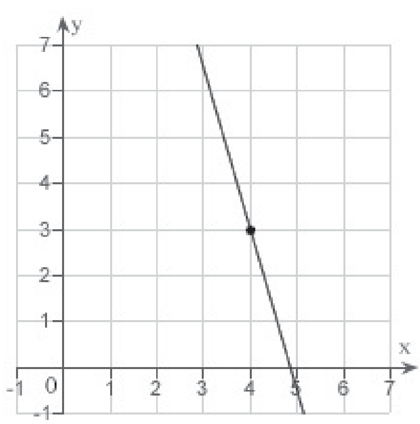
____ 1. Estimate the slope of the line from the graph.



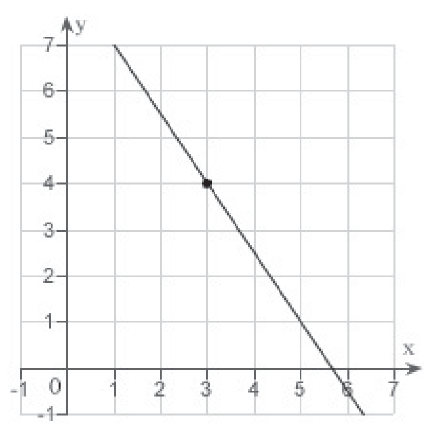
a. 3
b. $-\frac{1}{3}$
c. $-\frac{1}{6}$
d. $\frac{1}{6}$
e. 6

____ 2. Sketch the line passing through the point $(3, 4)$ with the slope $-\frac{3}{2}$.

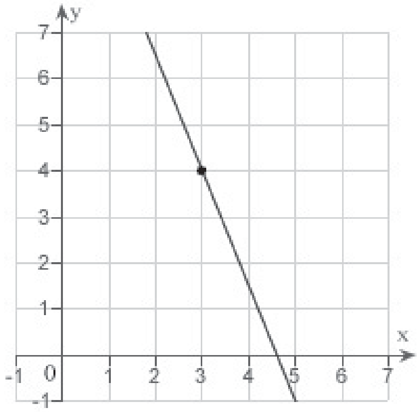
a.



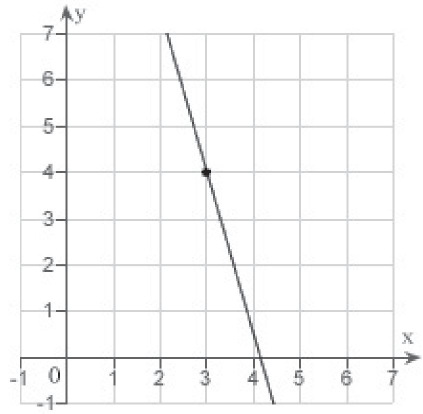
d.



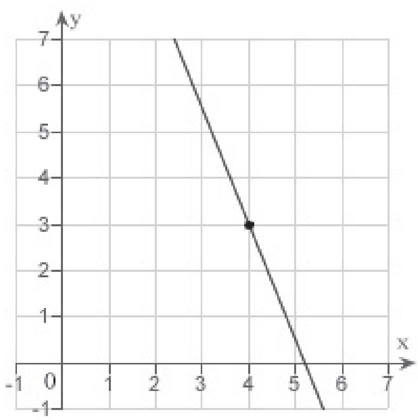
b.



e.



c.



____ 3. Find the slope of the line passing through the pair of points.

$(-3,-6),(0,-11)$

a. $\frac{3}{5}$

b. $-\frac{5}{3}$

c. $\frac{5}{3}$

d. 0

e. $-\frac{3}{5}$

____ 4. Find the slope of the line passing through the points $\left(-\frac{1}{8}, \frac{8}{3}\right)$ and $\left(-\frac{3}{16}, \frac{1}{24}\right)$.

a. 63
b. −21
c. 42
d. 21
e. −42

____ 5. If a line has slope $m = -4$ and passes through the point $(4, 8)$, through which of the following points does the line also pass?

a. $(1, 20)$
b. $(1, 12)$
c. $(1, 0)$
d. $(8, -16)$
e. $(8, -24)$

____ 6. A moving conveyor is built to rise 5 meters for every 7 meters of horizontal change. Find the slope of the conveyor.

a. 0
b. $\frac{5}{7}$
c. $\frac{7}{5}$
d. $-\frac{7}{5}$
e. $-\frac{5}{7}$

____ 7. A moving conveyor is built to rise 1 meter for every 5 meters of horizontal change. Suppose the conveyor runs between two floors in a factory. Find the length of the conveyor if the vertical distance between floors is 10 meters. Round your answer to the nearest meter.

a. 61 meters
b. 39 meters
c. 51 meters
d. 50 meters
e. 41 meters

____ 8. Find the slope of the line $x + 3y = 15$.

a. $\frac{1}{3}$
b. $-\frac{1}{5}$
c. $\frac{1}{5}$
d. $-\frac{1}{15}$
e. $-\frac{1}{3}$

____ 9. Find the *y*-intercept of the line $x + 4y = 8$.

a. $(0, 2)$
b. $(0, 4)$
c. $(0, 8)$
d. $(4, 0)$
e. $(2, 0)$

____ 10. Find an equation of the line that passes through the point $(7, 2)$ and has the slope *m* that is undefined.

a. $y = 7$
b. $x = 7$
c. $y = 2$
d. $x = 2$
e. $y = 7x$

____ 11. Find an equation of the line that passes through the point $(-11, -9)$ and has the slope $m = \frac{9}{2}$.

a. $y = \frac{9}{2}x - \frac{81}{2}$
b. $y = \frac{9}{2}x + \frac{81}{2}$
c. $y = \frac{9}{2}x + 162$
d. $y = \frac{9}{2}x$
e. $y = -\frac{9}{2}x$

____ 12. Find an equation of the line that passes through the points $(18, -7)$ and $(-18, 23)$.

a. $y = -\frac{5}{6}x - 8$
b. $y = \frac{5}{6}x - 8$
c. $y = \frac{5}{6}x + 8$
d. $y = -\frac{5}{6}x + 8$
e. $y = -\frac{5}{6}x$

____ 13. Find an equation of the line that passes through the points $\left(-\frac{8}{11}, -\frac{70}{11}\right)$ and $\left(\frac{3}{2}, -\frac{21}{4}\right)$.

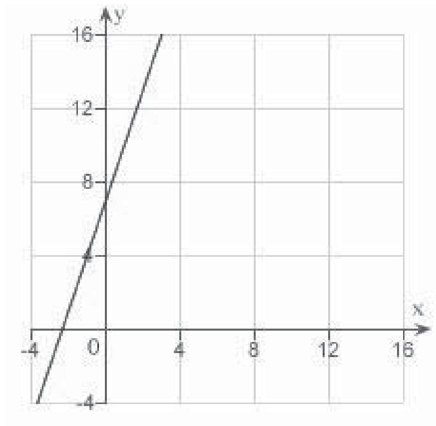
a. $y = \frac{1}{2}x$
b. $y = \frac{1}{2}x + 6$
c. $y = \frac{1}{2}x + 12$
d. $y = \frac{1}{2}x - 12$
e. $y = \frac{1}{2}x - 6$

____ 14. Use the result, "the line with intercepts $(a, 0)$ and $(0, b)$ has the equation $\frac{x}{a} + \frac{y}{b} = 1$, $a \neq 0, b \neq 0$", to write an equation of the line with *x*-intercept: $(8, 0)$ and *y*-intercept: $(0, 7)$.

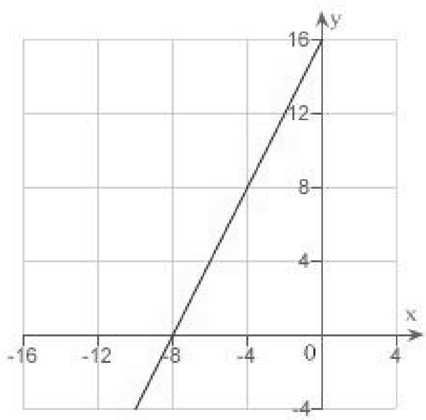
a. $8x - 7y - 8 = 0$
b. $7x - 8y + 7 = 0$
c. $8x + 7y + 8 = 0$
d. $7x + 8y + 56 = 0$
e. $7x + 8y - 56 = 0$

____ 15. Sketch a graph of the equation $y - 8 = 2(x + 4)$.

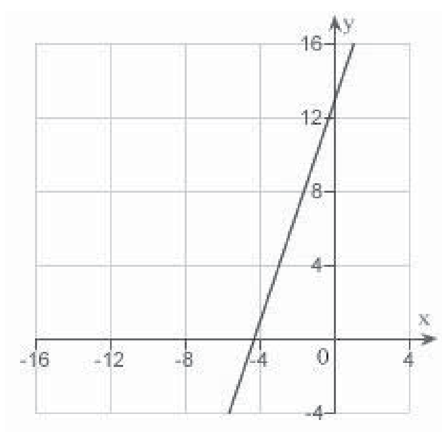
a.



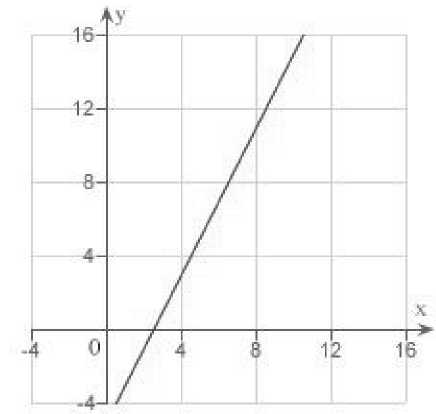
b.



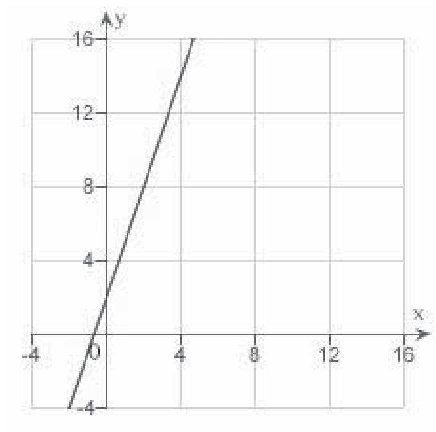
c.



d.



e.



____ 16. Write an equation of the line that passes through the given point and is perpendicular to the given line.

Point	Line
$(-1,-7)$	$x=6$

a. $y=7$
b. $y=-7$
c. $y=-1$
d. $x=-1$
e. $x=1$

____ 17. Write an equation of the line that passes through the given point and is parallel to the given line.

Point	Line
$(3,-4)$	$-2x-5y=9$

a. $-2x-5y=14$
b. $-2x-5y=23$
c. $2x-5y=14$
d. $-2x+5y=-26$
e. $2x-5y=23$

____ 18. Write an equation of the line that passes through the point $(-6,4)$ and is perpendicular to the line $x+y=5$.

a. $x-y+10=0$
b. $x-y+2=0$
c. $x+y-2=0$
d. $x+y+10=0$
e. $x+y-5=0$

____ 19. Write an equation of the line that passes through the point $\left(\frac{5}{4},\frac{5}{8}\right)$ and is parallel to the line $7x-3y=0$.

a. $56x-24y-55=0$
b. $56x+12y-55=0$
c. $56x-8y+55=0$
d. $56x+6y+55=0$
e. $56x+4y-55=0$

____ 20. A real estate office handles an apartment complex with 50 units. When the rent is $\$800$ per month, all 50 units are occupied. However, when the rent is $\$845$, the average number of occupied units drops to 47. Assume that the relationship between the monthly rent p and the demand x is linear. Write a linear equation giving the demand x in terms of the rent p.

a. $x = \frac{1}{15}\left(1595 - p\right)$
b. $x = \frac{1}{15}\left(1505 + p\right)$
c. $x = \frac{1}{45}\left(1550 + p\right)$
d. $x = \frac{1}{15}\left(1550 - p\right)$
e. $x = \frac{1}{45}\left(1595 - p\right)$

____ 21. A real estate office handles an apartment complex with 50 units. When the rent is $\$600$ per month, all 50 units are occupied. However, when the rent is $\$645$, the average number of occupied units drops to 47. Assume that the relationship between the monthly rent p and the demand x is linear. Predict the number of units occupied if the rent is raised to $\$660$.

a. 43 units
b. 54 units
c. 57 units
d. 49 units
e. 46 units

____ 22. Find the distance between the point $\left(-4, 7\right)$ and line $x - y - 2 = 0$ using the formula, $\text{Distance} = \dfrac{\left|Ax_1 + By_1 + C\right|}{\sqrt{A^2 + B^2}}$ for the distance between the point $\left(x_1, y_1\right)$ and the line $Ax + By + C = 0$.

a. $\frac{11\sqrt{2}}{2}$
b. $\frac{4\sqrt{3}}{3}$
c. $\frac{13\sqrt{2}}{2}$
d. $\frac{9\sqrt{2}}{2}$
e. $\frac{6\sqrt{3}}{3}$

____ 23. Suppose that the dollar value of a product in 2008 is $\$174$ and the rate at which the value of the product is expected to increase per year during the next 5 years is $\$7.50$. Write a linear equation that gives the dollar value V of the product in terms of the year t. (Let $t = 0$ represent 2000.) Round the numerical values in your answer to one decimal place, where applicable.

a. $V = 7.5t - 159$
b. $V = -7.5t - 114$
c. $V = -7.5t + 174$
d. $V = 7.5t + 114$
e. $V = 7.5t - 144$

____ 24. A company reimburses its sales representatives $\$175$ per day for lodging and meals plus 45¢ per mile driven. Write a linear equation giving the daily cost C to the company in terms of x, the number of miles driven. Round the numerical values in your answer to two decimal places, where applicable.

a. $C = -1.75x + 45$
b. $C = 0.45x + 175$
c. $C = -0.45x - 175$
d. $C = 0.45x - 175$
e. $C = 1.75x - 45$

____ 25. A company reimburses its sales representatives $\$160$ per day for lodging and meals plus 42¢ per mile driven. How much does it cost the company if a sales representative drives 135 miles on a given day? Round your answer to the nearest cent.

a. 227.20
b. 216.70
c. 136.35
d. 161.35
e. 191.70

P.2 Linear Models and Rates of Change
Answer Section

MULTIPLE CHOICE

1. ANS: E PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Estimate the slope of a line from its graph MSC: Skill
2. ANS: D PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Sketch the line passing through a point with specified slope MSC: Skill
3. ANS: B PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Calculate the slope of a line passing through two points MSC: Skill
4. ANS: C PTS: 1 DIF: Med REF: Section 0.2
OBJ: Calculate the slope of a line passing through two points MSC: Skill
5. ANS: A PTS: 1 DIF: Med REF: Section 0.2
OBJ: Identify a point on a line with specified properties MSC: Skill
6. ANS: B PTS: 1 DIF: Easy REF: Section 0.2
MSC: Application
7. ANS: C PTS: 1 DIF: Med REF: Section 0.2
OBJ: Calculate slopes in applications MSC: Application
8. ANS: E PTS: 1 DIF: Med REF: Section 0.2
OBJ: Manipulate a linear equation to determine its slope MSC: Skill
9. ANS: A PTS: 1 DIF: Med REF: Section 0.2
OBJ: Manipulate a linear equation to determine its y-intercept MSC: Skill
10. ANS: B PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and its slope MSC: Skill
11. ANS: B PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and its slope MSC: Skill
12. ANS: D PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Write an equation of a line given two points on the line MSC: Skill
13. ANS: E PTS: 1 DIF: Med REF: Section 0.2
OBJ: Write an equation of a line given two points on the line MSC: Skill
14. ANS: E PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Write an equation of a line given its x- and y-intercepts MSC: Skill
15. ANS: B PTS: 1 DIF: Med REF: Section 0.2
OBJ: Sketch the graph of a linear equation MSC: Skill
16. ANS: C PTS: 1 DIF: Med REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and a line to which it is parallel/perpendicular MSC: Skill
17. ANS: A PTS: 1 DIF: Med REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and a line to which it is parallel/perpendicular MSC: Skill
18. ANS: A PTS: 1 DIF: Med REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and a line to which it is perpendicular
MSC: Skill
19. ANS: A PTS: 1 DIF: Easy REF: Section 0.2
OBJ: Write an equation of a line given a point on the line and a line to which it is parallel
MSC: Skill

20.	ANS:	D	PTS:	1	DIF:	Med	REF:	Section 0.2
OBJ:	Write linear equations in applications						MSC:	Application
21.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.2
OBJ:	Evaluate linear equations in applications						MSC:	Application
22.	ANS:	C	PTS:	1	DIF:	Med	REF:	Section 0.2
OBJ:	Calculate the distance between a point and a line						MSC:	Skill
23.	ANS:	D	PTS:	1	DIF:	Easy	REF:	Section 0.2
OBJ:	Write linear equations in applications						MSC:	Application
24.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.2
OBJ:	Write linear equations in applications						MSC:	Application
25.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.2
OBJ:	Evaluate linear equations in applications						MSC:	Application

P.3 Functions and Their Graphs

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Evaluate (if possible) the function $f(x) = -6x - 5$ at $x = -2$. Simplify the result.

a. –7
b. 17
c. 3
d. 7
e. undefined

____ 2. Evaluate (if possible) the function $f(x) = \sqrt{x-5}$ at $x = 9$. Simplify the result.

a. 3
b. 2
c. -2
d. 4
e. undefined

____ 3. Evaluate (if possible) the function $g(x) = x^2(x+2)$ at $x = t - 6$. Simplify the result.

a. $t^3 - 4t^2 + 12t - 144$
b. $t^3 - 4t^2 + 84t - 144$
c. $t^3 - 16t^2 + 84t - 144$
d. $t^3 - 16t^2 + 12t - 144$
e. none of the above

____ 4. Let $f(x) = 14x + 8$. Then simplify the expression $\dfrac{f(x) - f(9)}{x - 9}$.

a. 15
b. 14
c. 19
d. 11
e. undefined

____ 5. Let $g(x) = \dfrac{1}{\sqrt{x+15}}$. Evaluate the expression $\dfrac{g(x) - g(-11)}{x+11}$ and then simplify the result.

a. $\dfrac{2\sqrt{x+15} - x - 15}{2(x+11)(x+15)}$
b. $\dfrac{2\sqrt{x+15} + x - 15}{2(x-11)(x+15)}$
c. $\dfrac{2\sqrt{x+15} + x - 15}{2(x+11)(x+15)}$
d. $\dfrac{2\sqrt{x+15} - x - 15}{2(x-11)(x+15)}$
e. undefined

____ 6. Find the domain and range of the function $f(x) = x^2 - 6$.

a. domain: $[-6, \infty)$
range: $[-6, \infty)$
b. domain: $[-6, \infty)$
range: $(-6, \infty)$
c. domain: $(-\infty, \infty)$
range: $(-6, \infty)$
d. domain: $(-\infty, \infty)$
range: $[6, \infty)$
e. domain: $(-\infty, \infty)$
range: $[-6, \infty)$

____ 7. Find the domain and range of the function $g(t) = \sqrt{t - 10}$.

a. domain: $[10, \infty)$
range: $(0, \infty)$
b. domain: $(10, \infty)$
range: $[0, \infty)$
c. domain: $[10, \infty)$
range: $(-\infty, \infty)$
d. domain: $[0, \infty)$
range: $[10, \infty)$
e. none of the above

____ 8. Find the domain and range of the function $h(x) = \dfrac{11}{x+6}$.

a. domain: $(-\infty, -6) \cup (-6, \infty)$
   range: $(-\infty, \infty)$
b. domain: $(-\infty, -6) \cup (-6, \infty)$
   range: $(-\infty, 0) \cup (0, \infty)$
c. domain: $(-\infty, -6] \cup [-6, \infty)$
   range: $(-\infty, 0) \cup (0, \infty)$
d. domain: $(-\infty, -6)$
   range: $(0, \infty)$
e. domain: $(-6, \infty)$
   range: $(0, \infty)$

____ 9. Evaluate the function $f(x) = \begin{cases} 2x+1, & x < 0 \\ 2x+2, & x \geq 0 \end{cases}$ at $f(5)$.

a. $f(5) = 6$
b. $f(5) = 5$
c. $f(5) = 13$
d. $f(5) = 11$
e. $f(5) = 12$

____ 10. Determine the domain and range of the function $f(x) = \begin{cases} 3x+2, & x < 0 \\ 3x+6, & x \geq 0 \end{cases}$.

a. domain: $(-\infty, 2)$
   range: $(-\infty, 2) \cap [6, \infty]$
b. domain: $(-\infty, \infty)$
   range: $(-\infty, 2) \cup [6, \infty)$
c. domain: $(-\infty, \infty)$
   range: $(-\infty, 2) \cup (\infty, 6]$
d. domain: $(-\infty, \infty)$
   range: $(\infty, 2) \cup (6, -\infty)$
e. domain: $(-\infty, 3)$
   range: $(-\infty, 2) \cap [6, \infty)$

____ 11. Determine whether *y* is a function of *x*.

$y - 5x^2 = 6$

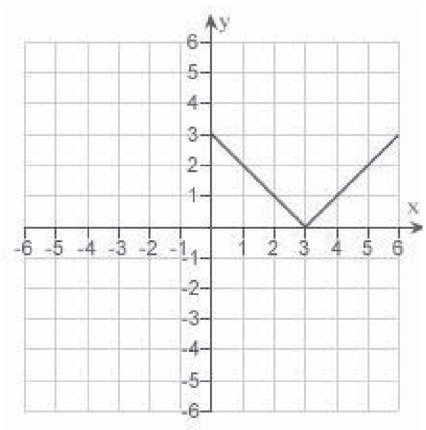
a. no
b. yes

____ 12. Determine whether y is a function of x.

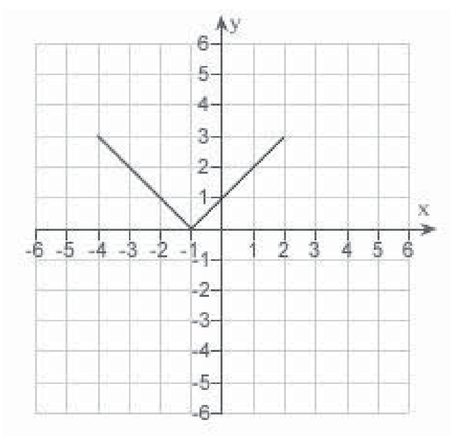
$xy - x^2 = 3y + x$

a. no
b. yes

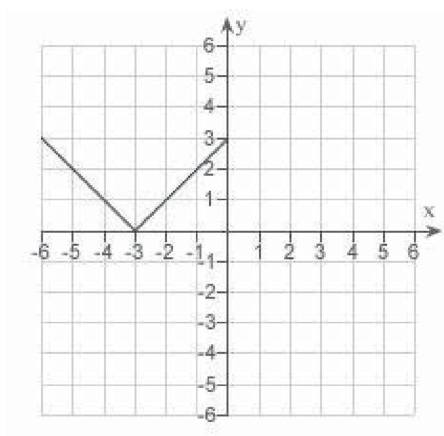
____ 13. Use the graph of $y = f(x)$ given below to find the graph of the function $y = f(x+5)$.



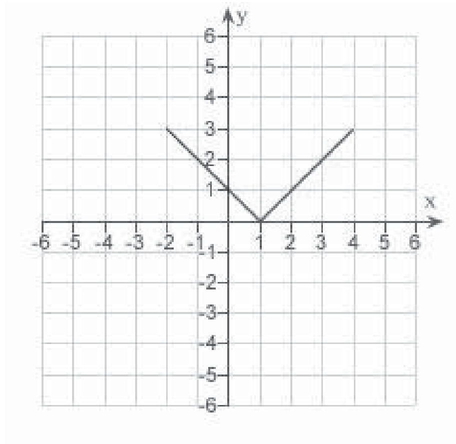
a.



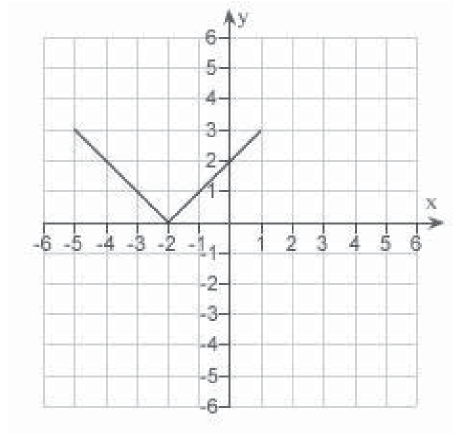
d.



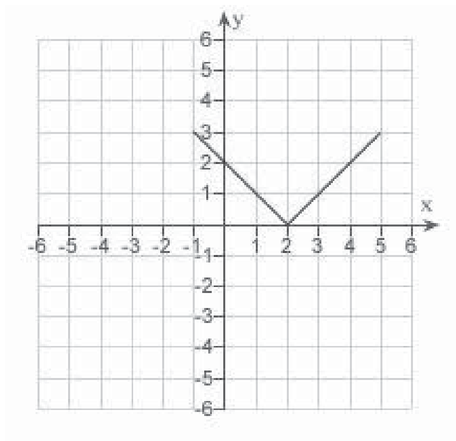
b.



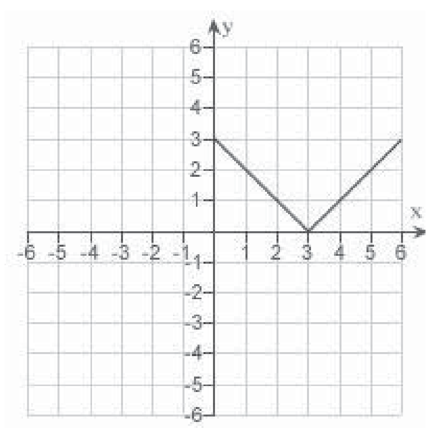
e.



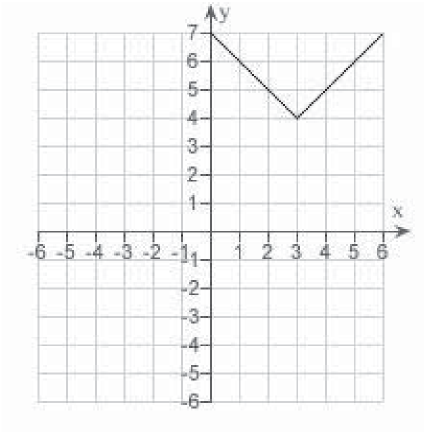
c.



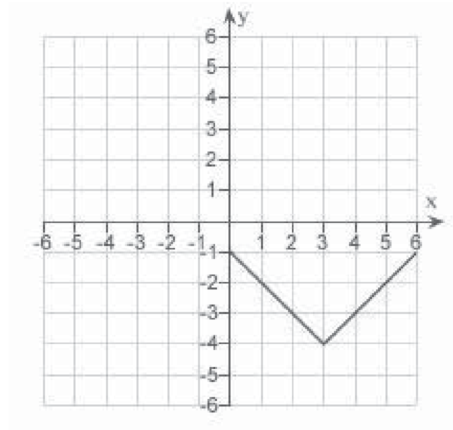
____ 14. Use the graph of $y = f(x)$ given below to find the graph of the function $y = f(x) + 4$.



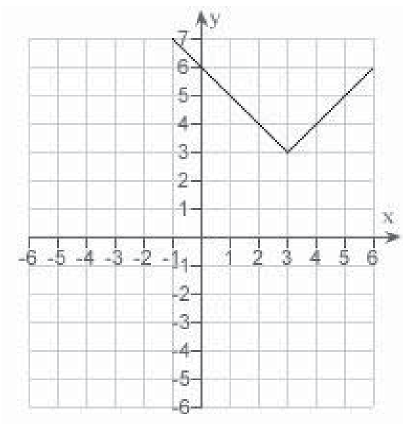
a.


y
x
7
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

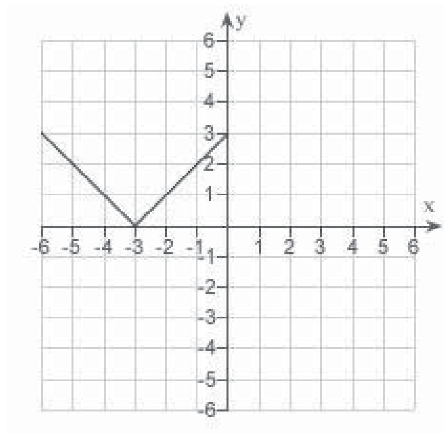
d.


y
x
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

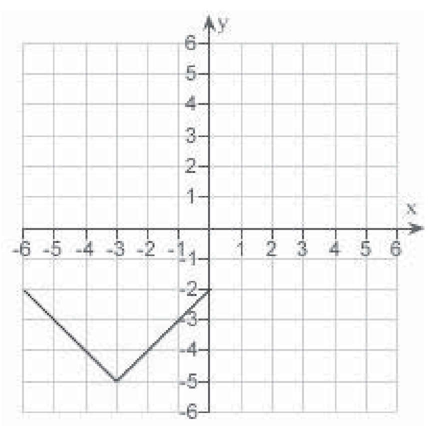
b.


y
x
7
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

e.


y
x
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

c.


y
x
6
5
4
3
2
1
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

____ 15. Given $f(x) = \cos x$ and $g(x) = \frac{\pi}{2}x$, evaluate $f(g(2))$.

a. 0
b. $\frac{1}{2}$
c. $\frac{\pi}{2}\sin(2)$
d. -1
e. $\frac{\pi}{2}\cos(2)$

____ 16. Determine whether the function is even, odd, or neither.

$f(x) = x^2(3-x)^2$

a. odd
b. even
c. neither

____ 17. Determine whether the function is even, odd, or neither.

$f(x) = x\sin 2x$

a. even
b. odd
c. neither

____ 18. Find the coordinates of a second point on the graph of a function *f* if the given point $\left(-\frac{6}{5}, 8\right)$ is on the graph and the function is even.

a. $\left(8, -\frac{6}{5}\right)$
b. $\left(-8, -\frac{6}{5}\right)$
c. $\left(-\frac{6}{5}, -8\right)$
d. $\left(\frac{6}{5}, -8\right)$
e. $\left(\frac{6}{5}, 8\right)$

____ 19. Find the coordinates of a second point on the graph of a function *f* if the given point $\left(-\frac{9}{8}, 5\right)$ is on the graph and the function is odd.

a. $\left(-5, -\frac{9}{8}\right)$

b. $\left(\frac{9}{8}, -5\right)$

c. $\left(-5, \frac{9}{8}\right)$

d. $\left(-\frac{9}{8}, -5\right)$

e. $\left(\frac{9}{8}, 5\right)$

____ 20. The horsepower *H* required to overcome wind drag on a certain automobile is approximated by $H(x) = 0.002x^2 + 0.005x - 0.027,\ 10 \le x \le 100$ where *x* is the speed of the car in miles per hour. Find $H\left(\frac{x}{1.1}\right)$. Round the numerical values in your answer to five decimal places.

a. $H\left(\frac{x}{1.1}\right) = 0.00150x^2 + 0.00455x - 0.02700$

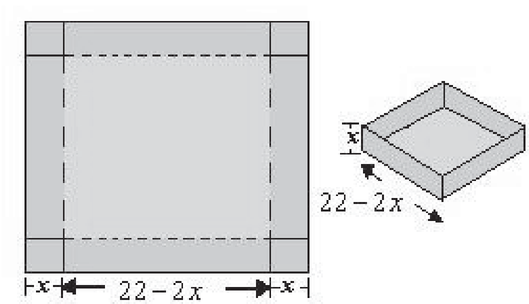
b. $H\left(\frac{x}{1.1}\right) = 0.00150x^2 + 0.00165x - 0.00455$

c. $H\left(\frac{x}{1.1}\right) = 0.00165x^2 + 0.00150x - 0.02700$

d. $H\left(\frac{x}{1.1}\right) = 0.00165x^2 + 0.00455x - 0.02700$

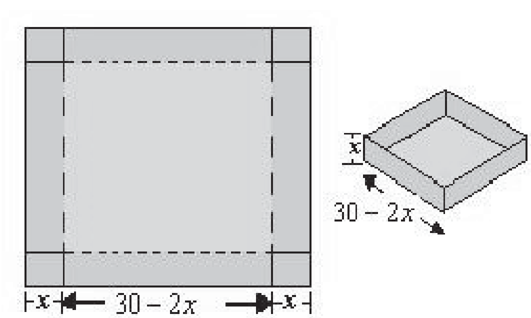
e. $H\left(\frac{x}{1.1}\right) = 0.00455x^2 + 0.00165x - 0.02700$

____ 21. An open box of maximum volume is to be made from a square piece of material 22 centimeters on a side by cutting equal squares from the corners and turning up the sides (see figure). Write the volume V as a function of x, the length of the corner squares.



a. $V = x(22-2x)^2$
b. $V = x + (22-x)^2$
c. $V = x^2 + (22-2x)$
d. $V = x^2(22-2x)$
e. $V = x(22-2x)$

____ 22. An open box of maximum volume is to be made from a square piece of material 30 centimeters on a side by cutting equal squares from the corners and turning up the sides(see figure). What is the domain of the function $V = x(30-2x)^2$.



a. domain: $0 < x < \infty$
b. domain: 30
c. domain: $0 < x < 15$
d. domain: $0 < x < 30$
e. domain: 15

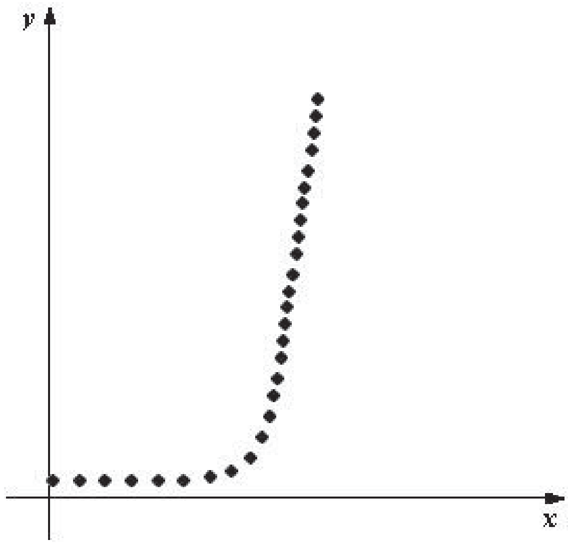
P.3 Functions and Their Graphs
Answer Section

1.	ANS:	D	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Evaluate a function and simplify						MSC:	Skill
2.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Evaluate a function and simplify						MSC:	Skill
3.	ANS:	C	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Evaluate a function and simplify						MSC:	Skill
4.	ANS:	B	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Simplify a difference quotient						MSC:	Skill
5.	ANS:	A	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Simplify a difference quotient						MSC:	Skill
6.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the domain and range of a function						MSC:	Skill
7.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the domain and range of a function						MSC:	Skill
8.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the domain and range of a function						MSC:	Skill
9.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Evaluate a piecewise function						MSC:	Skill
10.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the domain and range of a function						MSC:	Skill
11.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify equations that are functions						MSC:	Skill
12.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify equations that are functions						MSC:	Skill
13.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Graph transformations of functions						MSC:	Skill
14.	ANS:	A	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Graph transformations of functions						MSC:	Skill
15.	ANS:	D	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Evaluate composite functions						MSC:	Skill
16.	ANS:	C	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the type of symmetry of the graph of a function						MSC:	Skill
17.	ANS:	A	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify the type of symmetry of the graph of a function						MSC:	Skill
18.	ANS:	E	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify points on a graph using symmetry						MSC:	Skill
19.	ANS:	B	PTS:	1	DIF:	Easy	REF:	Section 0.3
OBJ:	Identify points on a graph using symmetry						MSC:	Skill
20.	ANS:	D	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Apply composite functions						MSC:	Application
21.	ANS:	A	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Create functions in applications						MSC:	Application
22.	ANS:	C	PTS:	1	DIF:	Med	REF:	Section 0.3
OBJ:	Identify domains in applications						MSC:	Application

P.4 Fitting Models to Data

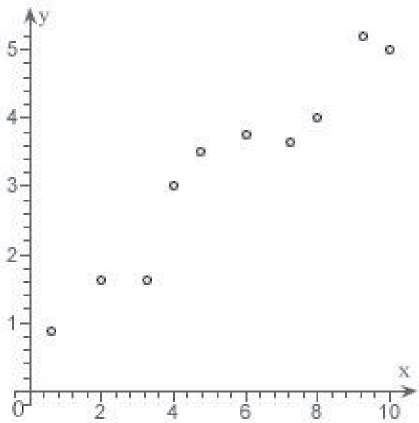
Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Determine which type of function would be most appropriate to fit the given data.



a. exponential
b. linear
c. quadratic
d. no relationship
e. trigonometric

____ 2. Which function below would be most appropriate model for the given data?



a. no apparent relationship between x and y
b. trigonometric
c. quadratic
d. linear

____ 3. Hooke's Law states that the force F required to compress or stretch a spring (within its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, $F = kd$ where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of F newtons is applied. Use the regression capabilities of a graphing utility to find a linear model for the data. Round the numerical values in your answer to three decimal places.

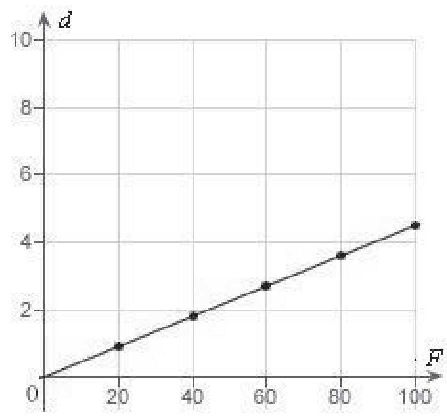
F	20	40	60	80	100
d	1.9	3.8	5.7	7.6	9.5

a. $d = 0.675F$
b. $d = 0.118F$
c. $d = 0.112F$
d. $d = 0.095F$
e. $d = 0.905F$

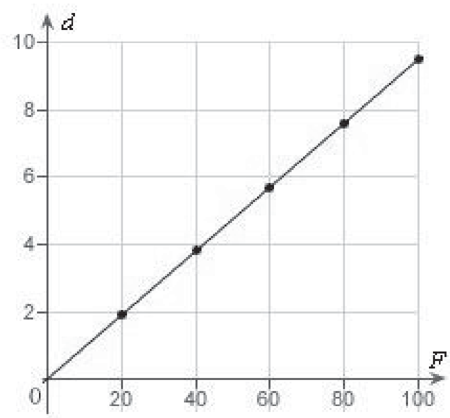
____ 4. Hooke's Law states that the force F required to compress or stretch a spring (within its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, $F = kd$ where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of F newtons is applied. Use a graphing utility to plot the data and graph the linear model.

F	20	40	60	80	100
d	1.3	2.6	3.9	5.2	6.5

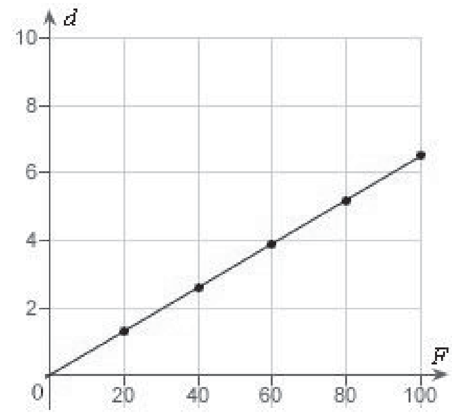
a.



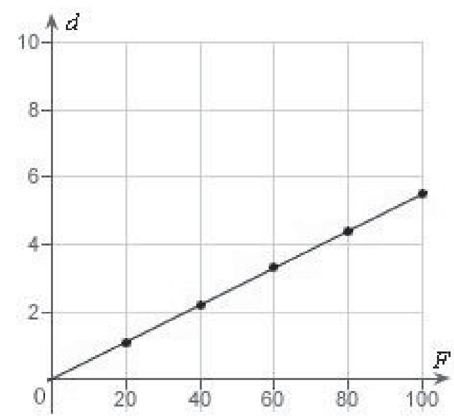
b.



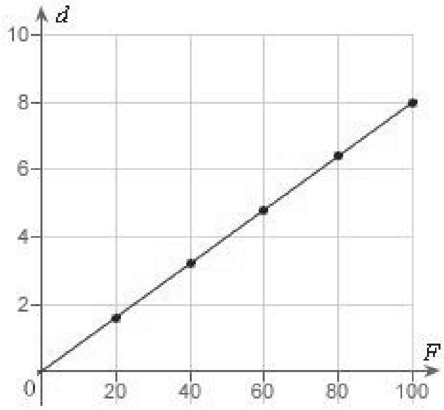
d.



e.



c.



____ 5. Hooke's Law states that the force F required to compress or stretch a spring (within its elastic limits) is proportional to the distance d that the spring is compressed or stretched from its original length. That is, $F = kd$ where k is a measure of the stiffness of the spring and is called the spring constant. The table shows the elongation d in centimeters of a spring when a force of F newtons is applied. Use the model $d = 0.085F$ to estimate the elongation of the spring when a force of 55 newtons is applied. Round your answer to two decimal places.

F	20	40	60	80	100
d	1.7	3.4	5.1	6.8	8.5

a. 8.08 cm
b. 6.38 cm
c. 4.68 cm
d. 2.98 cm
e. 9.78 cm

____ 6. In an experiment, students measured the speed s (in meters per second) of a falling object t seconds after it was released. The results are shown in the table below. Use the regression capabilities of a graphing utility to find a linear model for the data. Round all numerical values in your answer to one decimal place.

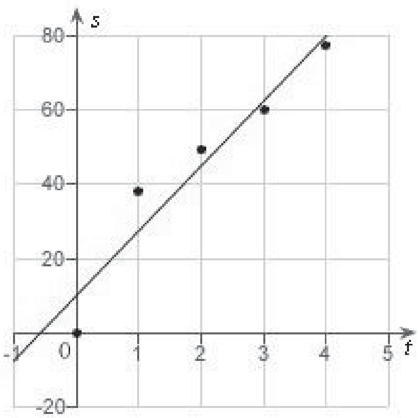
t	0	1	2	3	4
s	0	13.0	21.4	31.2	41.4

a. $s = 10.1t + 1.2$
b. $s = 3.0t - 1.2$
c. $s = 1.2t + 10.1$
d. $s = 10.1t + 3.0$
e. $s = 1.2t - 3.0$

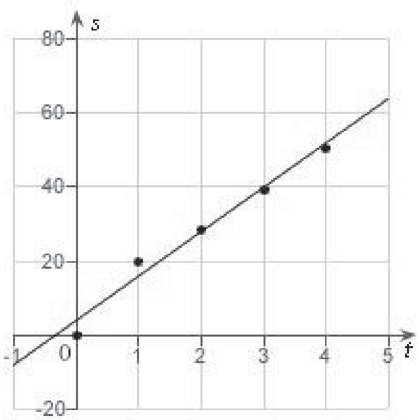
____ 7. In an experiment, students measured the speed *s* (in meters per second) of a falling object *t* seconds after it was released. The results are shown in the table below. Use the regression capabilities of a graphing utility to find a linear model for the data. Round all numerical values in your answer to one decimal place.

t	0	1	2	3	4
s	0	40	48.4	58.2	68.4

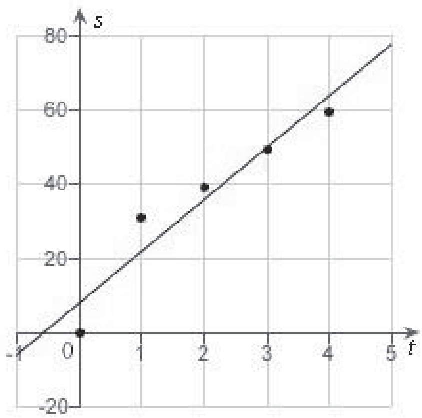
a.



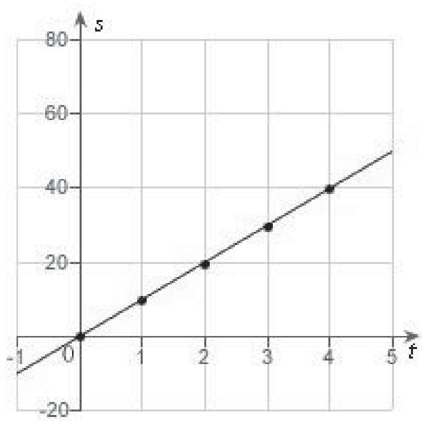
b.



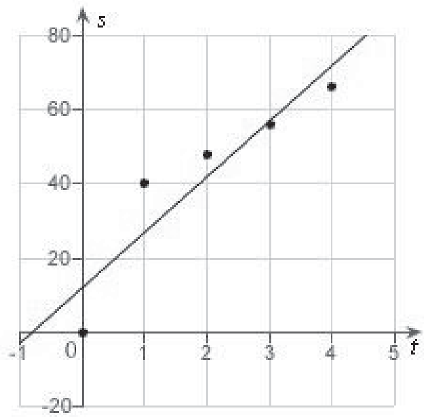
d.



e.



c.



____ 8. In an experiment, students measured the speed s (in meters per second) of a falling object t seconds after it was released. The results are shown in the table below. Use the model $s = 11.9t + 4.8$ to estimate the speed of the object after 1.5 seconds. Round your answer to two decimal places.

t	0	1	2	3	4
s	0	22.0	30.4	40.2	50.4

a. 21.05 meters/second
b. 20.95 meters/second
c. 24.25 meters/second
d. 23.55 meters/second
e. 22.65 meters/second

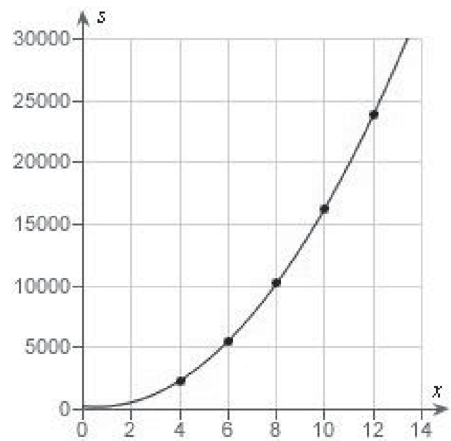
____ 9. Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use the regression capabilities of a graphing utility to fit a quadratic model to the data. Round the numerical values in your answer to two decimal places, where applicable.

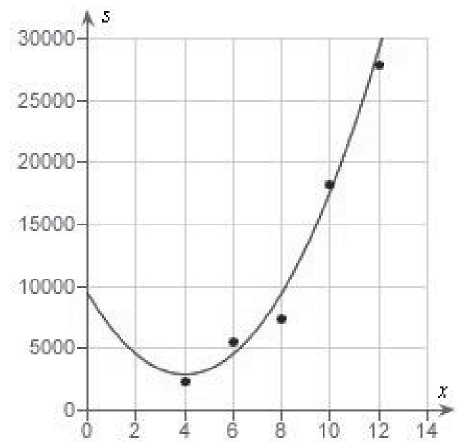
x	4	6	8	10	12
S	2422	5512	10,362	16,302	23,912

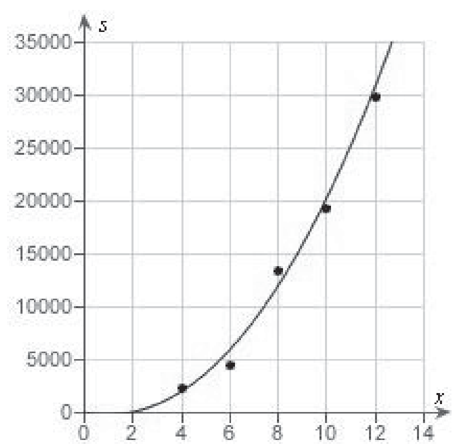
a. $S = 170.89x^2 - 209.79x + 324$
b. $S = 180.89x^2 - 205.79x + 324$
c. $S = 190.89x^2 + 201.79x + 331$
d. $S = 170.89x^2 - 209.79x + 327$
e. $S = 180.89x^2 + 203.79x - 331$

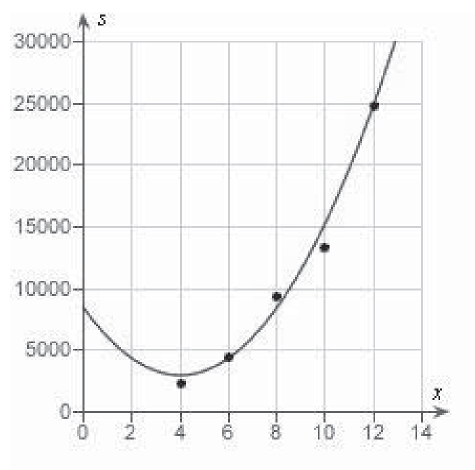
____ 10. Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use a graphing utility to plot the data and graph the quadratic model.

x	4	6	8	10	12
S	2370	4460	13,310	19,250	29,860

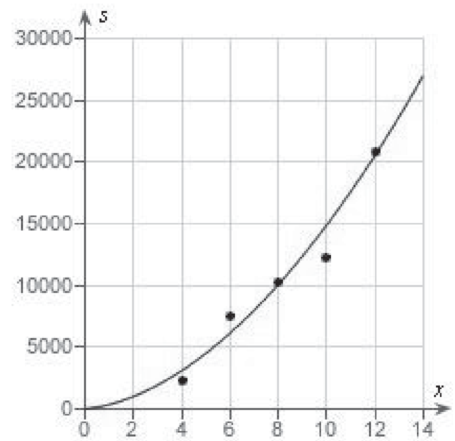
a.


d.


b.


e.


c.



_____ 11. Students in a lab measured the breaking strength S (in pounds) of wood 2 inches thick, x inches high, and 12 inches long. The results are shown in the table below. Use the model $S = 180.89x^2 - 205.79x + 284$ to approximate the breaking strength when $x = 2$. Round your answer to two decimal places.

x	4	6	8	10	12
S	2382	5472	10,322	16,262	23,872

a. 595.98 pounds
b. 390.19 pounds
c. 957.76 pounds
d. 801.77 pounds
e. 751.97 pounds

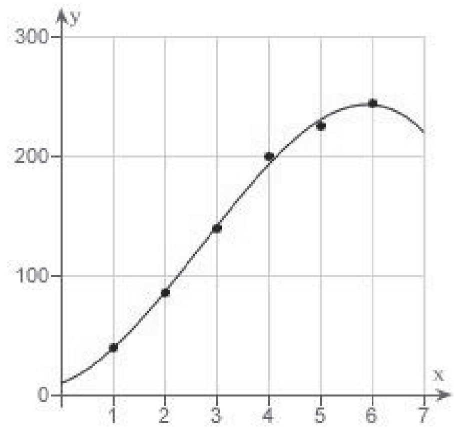
_____ 12. A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table below. Use the regression capabilities of a graphing utility to find a cubic model for the data. Round the numerical values in your answer to three decimal places, where applicable.

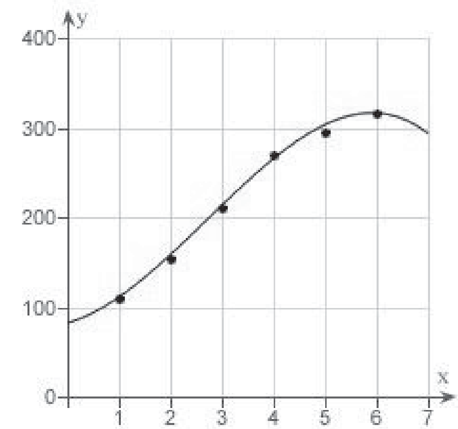
x	1	2	3	4	5	6
y	64	109	164	224	249	269

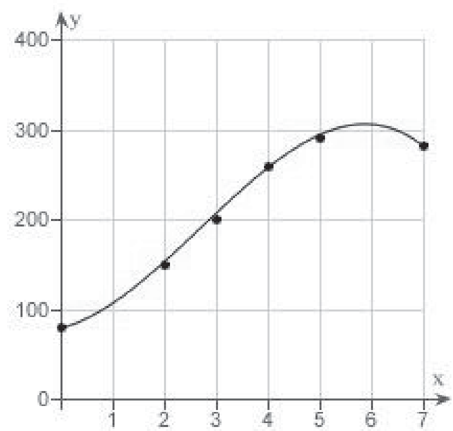
a. $y = -1.608x^3 - 14.583x^2 + 13.389x - 37$
b. $y = -1.706x^3 - 14.583x^2 - 16.389x + 34$
c. $y = 1.806x^3 + 11.583x^2 + 16.389x - 41$
d. $y = -1.806x^3 + 14.583x^2 + 16.389x + 34$
e. $y = 1.608x^3 + 11.583x^2 - 19.389x + 41$

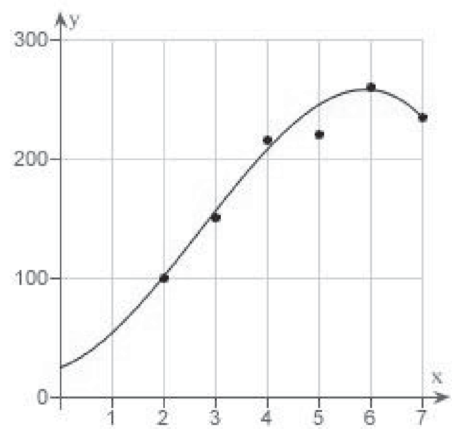
____ 13. A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table below. Use a graphing utility to plot the data and graph the cubic model.

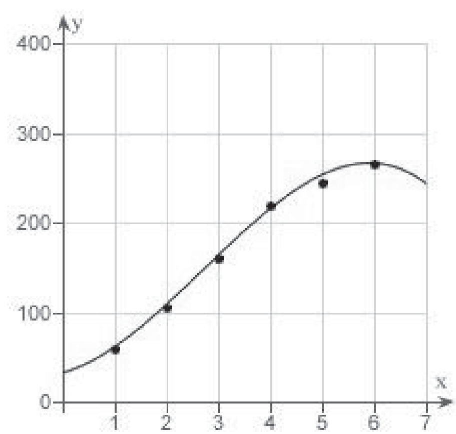
x	1	2	3	4	5	6
y	110	155	210	270	295	315

a.


d.


b.


e.


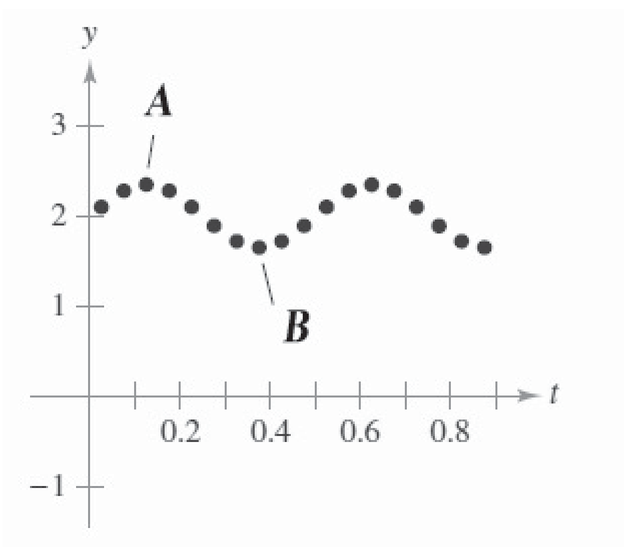
c.


____ 14. A V8 car engine is coupled to a dynamometer and the horsepower y is measured at different engine speeds x (in thousands of revolutions per minute). The results are shown in the table below. Use the model $y = -1.806x^3 + 14.58x^2 + 16.4x + 30$ to approximate the horsepower when the engine is running at 5500 revolutions per minute. Round your answer to two decimal places.

x	1	2	3	4	5	6
y	60	105	160	220	245	265

a. 260.77 hp
b. 262.73 hp
c. 262.36 hp
d. 261.38 hp
e. 261.91 hp

____ 15. The motion of an oscillating weight suspended by a spring was measured by a motion detector. The data collected and the approximate maximum (positive and negative) displacements from equilibrium are shown in the figure. The displacement is measured in centimeters, and the time is measured in seconds. Take $A(0.133,2.49)$ and $B(0.343,1.78)$. Approximate the amplitude and period of the oscillations.



a. Amplitude = 0.335. Period = 4.3.
b. Amplitude = 0.71. Period = 2.1.
c. Amplitude = 0.355. Period = 4.2.
d. Amplitude = 4.2. Period = 0.355.
e. Amplitude = 2.1. Period = 0.71.

P.4 Fitting Models to Data
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Identify the most appropriate function for a scatter plot MSC: Skill
2. ANS: D PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Identify the most appropriate function for a scatter plot MSC: Skill
3. ANS: D PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Write a linear model for data using the regression capabilities of a graphing utility
MSC: Application
4. ANS: D PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Plot data points and the graph of a linear model MSC: Application
5. ANS: C PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Evaluate linear models in applications MSC: Application
6. ANS: A PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Write a linear model for data using the regression capabilities of a graphing utility
MSC: Application
7. ANS: C PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Plot data points and the graph of a linear model MSC: Application
8. ANS: E PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Evaluate linear models in applications MSC: Application
9. ANS: B PTS: 1 DIF: Med REF: Section 0.4
OBJ: Write a quadratic model for data using the regression capabilities of a graphing utility
MSC: Application
10. ANS: B PTS: 1 DIF: Med REF: Section 0.4
OBJ: Plot data points and the graph of a quadratic model MSC: Application
11. ANS: A PTS: 1 DIF: Med REF: Section 0.4
OBJ: Evaluate quadratic models in applications MSC: Application
12. ANS: D PTS: 1 DIF: Med REF: Section 0.4
OBJ: Evaluate cubic models in applications MSC: Application
13. ANS: D PTS: 1 DIF: Med REF: Section 0.4
OBJ: Plot data points and the graph of a cubic model MSC: Application
14. ANS: A PTS: 1 DIF: Med REF: Section 0.4
OBJ: Write a cubic model for data using the regression capabilities of a graphing utility
MSC: Application
15. ANS: C PTS: 1 DIF: Easy REF: Section 0.4
OBJ: Fit a trigonometric model to a real-life data set. MSC: Application

1.1 A Preview of Calculus

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

Find the distance traveled in 16 seconds by an object traveling at a constant velocity of 20 feet per second.

a. calculus, 320 ft
b. calculus, 340 ft
c. precalculus, 320 ft
d. calculus, 640 ft
e. precalculus, 640 ft

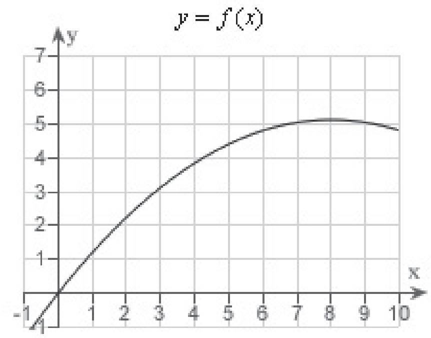
____ 2. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

Find the distance traveled in 20 seconds by an object moving with a velocity of $v(t) = 8 + 6\cos t$ feet per second.

a. calculus, 162.4485 ft
b. precalculus, 163.7985 ft
c. calculus, 165.4777 ft
d. precalculus, 165.4777 ft
e. precalculus, 162.4485 ft

____ 3. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

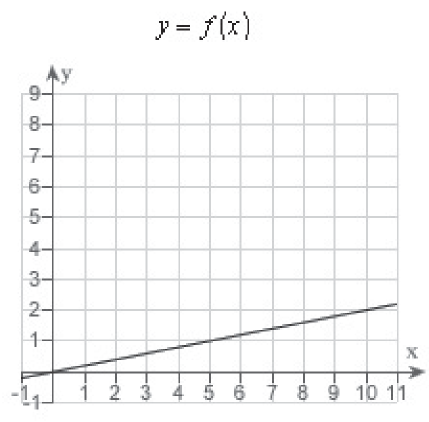
A cyclist is riding on a path whose elevation is modeled by the function $f(x) = 0.08\left(16x - x^2\right)$ where x and $f(x)$ are measured in miles. Find the rate of change of elevation when $x = 4$.



a. precalculus, 0.08
b. calculus, 0.2
c. calculus, 0.64
d. calculus, 0.08
e. precalculus, 0.2

____ 4. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

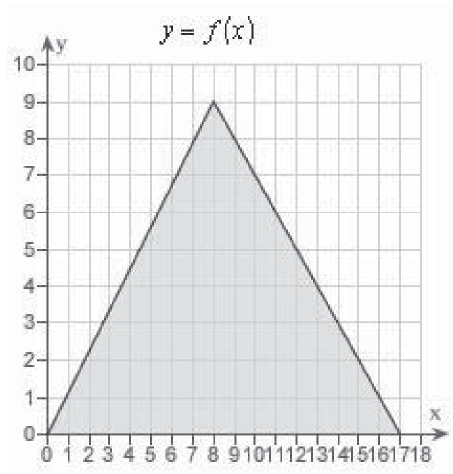
A cyclist is riding on a path whose elevation is modeled by the function $f(x) = 0.2x$ where x and $f(x)$ are measured in miles. Find the rate of change of elevation when $x = 5$.



a. calculus, 2
b. precalculus, 0.2
c. calculus, 0.2
d. precalculus, 2
e. precalculus, 0.45

____ 5. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

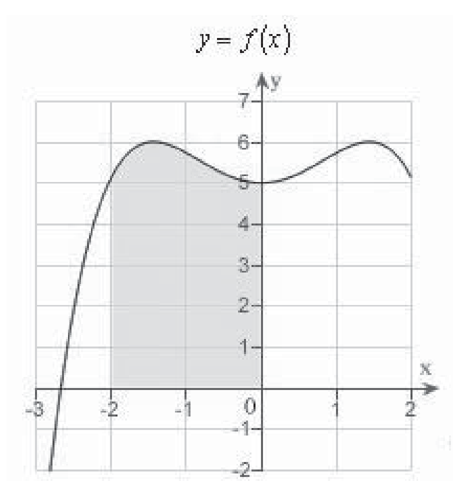
Find the area of the shaded region bounded by the triangle with vertices (0,0), (8,9), (17,0).



a. precalculus , 153
b. calculus , 229.5
c. precalculus , 76.5
d. precalculus , 229.5
e. calculus , 153

____ 6. Decide whether the following problem can be solved using precalculus, or whether calculus is required. If the problem can be solved using precalculus, solve it. If the problem seems to require calculus, use a graphical or numerical approach to estimate the solution.

Find the area of the shaded region.

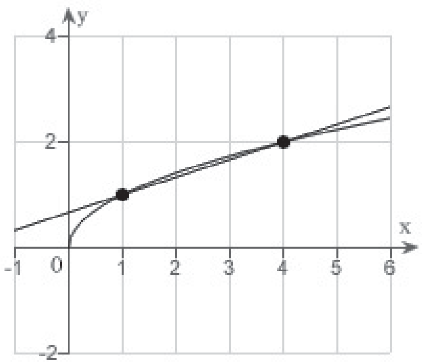


a. calculus , 11
b. precalculus , 11
c. precalculus , 13

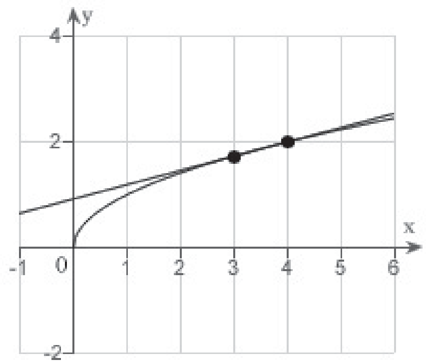
d. calculus , 16
e. precalculus , 16

____ 7. Consider the function $f(x) = \sqrt{x}$ and the point $P(4, 2)$ on the graph of *f*. Graph *f* and the secant line passing through $P(4, 2)$ and $Q\left(x, f(x)\right)$ for $x = 3$.

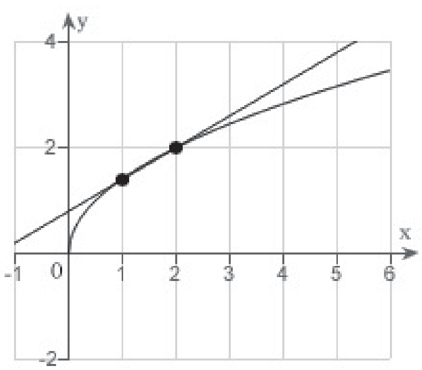
a.



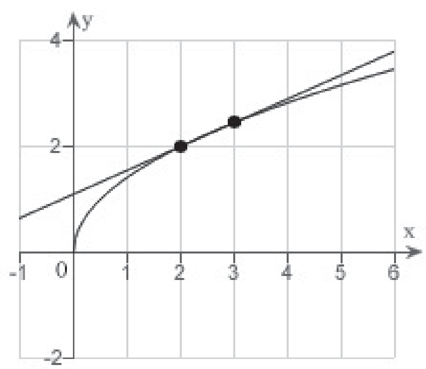
d.



b.



e.



c.